

**Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, DC 20554**

In the Matter of)	
)	
Amendment of Part 15 of the)	
Commission's Rules To Establish)	ET Docket No. 10-23
Regulations for Tank Level Probing Radars)	
in the Frequency Band 77-81 GHz)	
)	
and)	
)	
Amendment of Part 15 of the)	
Commission's Rules To Establish)	
Regulations for Level Probing Radars and)	
Tank Level Probing Radars in the)	
Frequency Bands 5.925-7.250 GHz, 24.05-)	
29.00 GHz and 75-85 GHz)	

COMMENTS OF HACH COMPANY

Hach Company ("Hach"), on behalf of itself and its affiliate, OTT Hydromet GmbH ("OTT"), submits these comments in response to the Commission's Further Notice of Proposed Rulemaking in the above-referenced docket to support the adoption of Part 15 rules to permit unlicensed operation of level probing radars.¹

I. INTRODUCTION AND SUMMARY

Hach manufactures and distributes analytical instruments and measurement devices used for testing water and other liquids. The company is headquartered in Loveland, Colorado and employs over 800 employees at this location. Hach's products are designed specifically for quality, accuracy, and simplicity, and are currently in use around the world.

¹ *Amendment of Part 15 of the Commission's Rules To Establish Regulations for Tank Level Probing Radars in the Frequency Band 77-81 GHz, and Amendment of Part 15 of the Commission's Rules To Establish Regulations for Level Probing Radars and Tank Level Probing Radars in the Frequency Bands 5.925-7.250 GHz, 24.05-29.00 GHz and 75-85 GHz*, ET Docket No. 10-23, Further Notice of Proposed Rulemaking, FCC 12-34 (rel. Mar. 27, 2012) ("*Further Notice*").

OTT, Hach's German manufacturing affiliate, has developed a level probing radar ("LPR") device that is designed to measure water levels in outdoor settings. The device currently is marketed and sold outside of the United States and complies with the European Telecommunications Standards Institute ("ETSI") standards for Short Range Devices, including radars.

Despite demand from U.S. customers, Hach is unable to market or sell these devices for commercial use in the United States because the LPRs operate at power levels that exceed the Section 15.209 general emission limits for unlicensed devices. Therefore, Hach has a keen interest in the adoption of rules that would allow the expanded development of reliable radar LPR devices. Permitting LPRs to be operated in an outdoor environment will serve the public interest, as these devices have proven to be critical in applications relating to water safety, flood warnings and scientific research.

Hach supports the adoption of the proposed rule Section 15.256, which includes technical standards that are based on the ETSI standards. In particular, these standards maintain sufficient flexibility to permit different LPR antenna technologies that currently are available. In these Comments, Hach identifies certain technical clarifications to the Commission's proposed rule that are necessary to avoid ambiguity and inconsistent interpretations of the standards and requirements by LPR device developers and by Telecommunication Certification Bodies ("TCBs").

II. FACILITATING THE DEPLOYMENT OF LEVEL PROBING RADARS SERVES THE PUBLIC INTEREST

Hach urges the Commission to adopt the proposed rules (with the modifications discussed below) in order to allow LPR devices to be marketed, sold and operated in the United States. Hach respectfully requests that the Commission take expeditious action in this proceeding in order to speed the availability of these devices to the U.S. market. Level probing radars provide non-contact water level measurement of streams, rivers, lakes, and reservoirs. The increased accuracy in water level measurements that would be made possible by the higher power levels proposed in Section 15.256 are critical for daily management of the nation's water resources. Further, these LPRs would enable scientists and researchers to collect vital data about current water levels in connection with flood warnings, navigation, and water allocation, as well as environmental assessment and water supply planning. Federal, state, and local governments, as well as private environmental companies, regularly monitor surface water levels for these purposes. Measurement equipment that needs to be placed in the water is susceptible to damage and often needs to be replaced frequently. By contrast, LPRs do not require equipment to come into contact with water, and thereby eliminate the need for technicians or scientists to enter the water. Thus, LPRs provide a cost-efficient and safe means of obtaining water level measurements.

LPRs are generally oriented toward the ground and are unlikely to operate in close proximity to other radio frequency devices. As illustrated in Figures 1 and 2 below, LPRs are mounted by professionals directly above the water being monitored, either under or along the side of a bridge or other structure:



Figure 1. LPR mounted on a bridge above a river.



Figure 2. Close-up view of a planar antenna LPR mounted on a bridge above a river.

LPR monitoring sites are generally remote and located away from main channels for vessel traffic and recreation areas, in order to obtain accurate water levels readings that are unaffected by the wake of boats or other man-made movement of the water. Therefore, the likelihood of harmful interference by an LPR into other operations in the same frequency band is extremely low.

III. TECHNICAL COMMENTS

A. The Proposed Antenna Gain Requirements Allow Flexibility for Different LPR Antenna Technologies

Hach supports the technical requirements for LPRs proposed in the *Further Notice*. These levels allow sufficient flexibility to accommodate different LPR antenna technologies, and thus, should not be modified to be more stringent. Both the Commission's

proposed Section 15.256 and ETSI standard EN 302 729-1 include technical requirements that are based on an assumption that the device at issue is equipped with a horn antenna.² However, LPR devices may also employ planar antennas, which have a wide, flat shape (rather than an elongated, narrow horn). As a result, planar antennas typically have an antenna beam width and side lobe gains that may be higher than those of horn antennas, but planar antennas can still operate within the proposed technical specifications in the *Further Notice*. To retain this flexibility in antenna design, the proposed technical requirements in the *Further Notice* should not be made any more restrictive than the parameters included in the proposed Sections 15.256(h) and (i).

Planar antennas have advantages over horn antennas in certain circumstances. For example, the outer dimensions of a planar antenna are much smaller than a typical horn antenna. Large antennas mounted in sparsely populated or uninhabited areas are often susceptible to vandalism, and thus, small measurement devices such as planar antenna LPRs are less obtrusive and, in Hach's experience, less likely to be damaged.

B. Peak and Average Power Calculations Should Be Specified by the Rules to Avoid Ambiguity

Hach requests that the Commission clarify the proposed Section 15.256(f)(2) to identify a correction factor for the peak and average measurements for LPR devices. Including these parameters is necessary to avoid the possibility of varying interpretations by TCBs and by device developers and manufacturers.

On LPR devices that use pulse radar, the pulse repetition frequency ("PRF") may require the use of a resolution bandwidth ("RBW") on the spectrum analyser of more than

² ETSI EN 302 729-1 Section 7.4.2 ("LPR antennas are typically horn antennas or parabolic antennas").

1 MHz for the measurement of the carrier. Some measurement equipment, however, may not be capable of supporting the required RBW when the PRF is high. Therefore, a scaling or correction factor is needed in these circumstances to obtain an accurate power measurement. For example, the ETSI standard for LPRs recommends a RBW of five times the PRF in order to ensure that the amplitude of the spectral lines is included in the RBW pass-band.³ This larger RBW should be taken into account by calculating a correction factor of $20 \log (1/\text{RBW})$ [dB] to compare the wideband measurement result with the 1 MHz limit. However, the calculation of the average power correction is not included in either the proposed Section 15.256 or in the ETSI standard EN 302 729-1. In order to avoid ambiguity and differing interpretations of power measurement requirements, Section 15.256 should include the calculation of the average power correction using a correction factor of $20 \log (1/\text{RBW})$ [dB].

In addition, under the ETSI standard, a RBW is taken into account for the peak power measurement by calculating a correction factor of $20 \log (50/\text{RBW})$ [dB] to compare the measurement result with the 50 MHz limits. Therefore, Hach recommends that the Commission include in Section 15.256 a correction factor for the peak power measurements, as is specified in Section 7.3.2 of ETSI EN 302 729-1.

C. The Rules Should Distinguish Unwanted Digital Emissions from Harmonic Emissions

The proposed Section 15.256 would establish the limit for unwanted emissions in reference to the general limits for intentional radiators in Section 15.209. However, the proposed rule does not make a clear distinction between harmonic emissions from digital circuitry used to enable the operation of the transmitter and unwanted digital emissions from circuitry used to control the functions and capabilities other than the operation of the transmitter. By contrast, the

³ ETSI EN 302 729-1 Section 7.2.2

Commission has recognized this distinction in connection with other Part 15 intentional radiators, and in those contexts, has adopted separate limits for harmonic emissions and digital emissions.⁴ Similarly, the ETSI approach distinguishes between harmonic and digital emissions in LPRs.⁵

Hach urges the Commission to adopt distinct limits for harmonic and digital emissions, consistent with the ETSI standard and the Commission's approach in Section 15.252. Establishing a limit for harmonic emissions at a mean power spectral density (average value) of 20 dB below the fundamental emission would bring the Commission's LPR rule in line with the ETSI standard. Adopting rules consistent with the ETSI standard would increase opportunities for manufacturers to take advantage of economies of scale by developing LPR devices that can be used in Europe and in the United States.

⁴ See e.g. 47 C.F.R. § 15.252(b)(6) ("Emissions from digital circuitry used to enable the operation of the transmitter may comply with the limits in § 15.209 Emissions from . . . digital circuitry used to control additional functions or capabilities other than the operation of the transmitter, are subject to the limits contained in subpart B of this part," which governs the operation of unintentional radiators.).

⁵ See ETSI EN 302 729-1 Section 7.2.3.

IV. CONCLUSION

For the foregoing reasons, Hach urges the Commission to adopt the proposed Part 15 rules to permit the unlicensed operation of LPR for outdoor use, on an expedited basis. In addition, Hach requests that the rules include the clarifications recommended in these Comments in order to provide certainty to device developers and manufacturers, as well as TCBs, regarding the technical requirements.

Respectfully submitted,

/s/

Ephraim Starr
Vice President & General Counsel
HACH COMPANY
5600 Lindbergh Drive
Loveland, CO 80538

James H. Barker
Elizabeth R. Park
LATHAM & WATKINS LLP
555 Eleventh Street, NW
Washington, DC 20004

Counsel for Hach Company

May 30, 2012